

WHAT IS CLAIMED IS:

1. A wireless linear motor comprising:

a stationary stator having permanent magnets;

5 a movable stage having coils and a controller with a transceiver for wirelessly communicating with an external data processing system, the controller adapted to energize the coils to position the stage over the stator in response to control signals from the external system; and,

10 a frame having first and second electrically conductive linear guides for slideably mounting the stage over the stator, wherein each linear guide has a stage portion attached to the stage through a first electrical insulator, a frame portion attached to the frame through a second electrical insulator, a plurality of ball bearings disposed between and electrically coupling the stage and frame portions, and a conductor coupling the stage portion to the controller for providing electrical power from an external power supply to the controller through the frame portion of each guide.

15 2. The wireless linear motor of claim 1 wherein the stator is incorporated in the frame.

3. The wireless linear motor of claim 1 wherein a linear recess is defined in the stage portion for receiving the frame portion.

20 4. The wireless linear motor of claim 1 and further comprising position sensors coupled to the controller for providing position signals for the stage to the external system for generating the control signals.

5. The wireless linear motor of claim 1 and further comprising magnetic sensors mounted on the stage and coupled to the controller for providing magnetic pole signals indicative of the location of the stage relative to the permanent magnets of the stator.

6. The wireless linear motor of claim 5 wherein the magnetic sensors are Hall Effect sensors.

7. The wireless linear motor of claim 1 and further comprising a battery mounted on the stage and coupled to the controller for delivering supplemental power to the controller.

5 8. A wireless linear motor comprising:

a stationary stator having permanent magnets;

10 a movable stage having coils and a controller with a transceiver for wirelessly communicating with an external data processing system, the controller adapted to energize the coils to position the stage over the stator in response to control signals from the external system; and,

15 a frame having first and second magnetically permeable linear guides for slideably mounting the stage over the stator to form a magnetic circuit linking the frame and stage, wherein each linear guide has a stage portion attached to the stage and wound with a stage coil, a frame portion attached to the frame and wound with a frame coil, a plurality of ball bearings disposed between and magnetically coupling the stage and frame portions, electric conductors coupling the frame coil to an external power supply for generating a magnetic flux in the frame portion, and electric conductors coupling the stage coil to the controller for providing electrical power induced in the stage coil by the magnetic flux.

20 9. The wireless linear motor of claim 8 wherein the stator is incorporated in the frame.

10. The wireless linear motor of claim 8 wherein a linear recess is defined in the stage portion for receiving the frame portion.

25 11. The wireless linear motor of claim 8 and further comprising position sensors coupled to the controller for providing position signals for the stage to the external system for generating the control signals.

12. The wireless linear motor of claim 8 and further comprising magnetic sensors mounted on the stage and coupled to the controller for providing magnetic pole signals indicative of the location of the stage relative to the permanent magnets of the stator.

13. The wireless linear motor of claim 12 wherein the magnetic sensors are Hall Effect sensors.

14. The wireless linear motor of claim 8 and further comprising a battery mounted on the stage and coupled to the controller for delivering supplemental power to the controller.

15. A wireless linear motor comprising:

a stationary stator having permanent magnets;

10 a movable stage having coils and a controller with a transceiver for wirelessly communicating with an external data processing system, the controller adapted to energize the coils to position the stage over the stator in response to control signals from the external system; and,

15 a frame having first and second electrically conductive linear guides for slideably mounting the stage over the stator, wherein each linear guide has a stage portion attached to the stage through a first electrical insulator, a frame portion attached to the frame through a second electrical insulator, a plurality of ball bearings disposed between and electrically coupling the stage and frame portions, a brush mounted on the stage portion and contacting the frame portion, and a conductor coupling the brush to the controller for
20 providing electrical power from an external power supply to the controller through the frame portion of each guide.

16. The wireless linear motor of claim 15 wherein the stator is incorporated in the frame.

17. The wireless linear motor of claim 15 wherein a linear recess is defined in the stage portion for receiving the frame portion.

18. The wireless linear motor of claim 15 and further comprising position sensors coupled to the controller for providing position signals for the stage to the external system for generating the control signals.

19. The wireless linear motor of claim 15 and further comprising magnetic sensors mounted on the stage and coupled to the controller for providing magnetic pole signals indicative of the location of the stage relative to the permanent magnets of the stator.

20. The wireless linear motor of claim 19 wherein the magnetic sensors are Hall Effect sensors.

21. The wireless linear motor of claim 15 and further comprising a battery mounted on the stage and coupled to the controller for delivering supplemental power to the controller.

22. The wireless linear motor of claim 15 wherein the brush is spring mounted on the stage.

23. A power supply circuit for a linear motor, the motor having a stationary stator including permanent magnets, a movable stage including coils and a controller for communicating with an external data processing system and adapted to energize the coils to position the movable stage over the stationary stator in response to control signals from the external system, the circuit comprising:

first and second electrically conductive linear guides mounted on a frame and for slideably mounting the stage over the stator, wherein each linear guide has a stage portion attached to the stage through a first electrical insulator, a frame portion attached to the frame through a second electrical insulator, a plurality of ball bearings disposed between and electrically coupling the stage and frame portions, and a conductor coupling the stage portion to the controller for providing electrical power from an external power supply to the controller through the frame portion of each guide.

24. The power supply circuit of claim 23 and further comprising a battery mounted on the stage and coupled to the controller for delivering supplemental power to the controller.

25. A power supply circuit for a linear motor, the motor having a stationary stator including permanent magnets, a movable stage including coils and a controller for communicating with an external data processing system and adapted to energize the coils to position the movable stage over the stationary stator in response to control signals from the external system, the circuit comprising:

first and second magnetically permeable linear guides mounted on a frame and for slideably mounting the stage over the stator to form a magnetic circuit linking the frame and stage, wherein each linear guide has a stage portion attached to the stage and wound with a stage coil, a frame portion attached to the frame and wound with a frame coil, a plurality of ball bearings disposed between and magnetically coupling the stage and frame portions, electric conductors coupling the frame coil to an external power supply for generating a magnetic flux in the frame portion, and electric conductors coupling the stage coil to the controller for providing electrical power induced in the stage coil by the magnetic flux.

26. The power supply circuit of claim 25 and further comprising a battery mounted on the stage and coupled to the controller for delivering supplemental power to the controller.

27. A power supply circuit for a linear motor, the motor having a stationary stator including permanent magnets, a movable stage including coils and a controller for communicating with an external data processing system and adapted to energize the coils to position the movable stage over the stationary stator in response to control signals from the external system, the circuit comprising:

first and second electrically conductive linear guides mounted on a frame and for slideably mounting the stage over the stator, wherein each linear guide has a stage portion attached to the stage through a first electrical insulator, a frame portion attached to the frame through a second electrical insulator, a plurality of ball bearings disposed between and electrically coupling the stage and frame portions, a brush mounted on the stage portion and contacting the frame portion, and a conductor coupling the brush to the controller for providing electrical power from an external power supply to the controller through the frame portion of each guide.

28. The power supply circuit of claim 27 wherein the brush is spring mounted on the stage.
29. The power supply circuit of claim 27 and further comprising a battery mounted on the stage and coupled to the controller for delivering supplemental power to the controller.